

Title: Basketball game perturbations according to game context and conditions.

Oral Presentation

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## Introduction

In the last few years team sports are being studied within a complex adaptive systems approach. From this perspective, the importance of game complexity, team self-organization, non-linear and multidimensional performance models has been growing from micro to macro issues. One interesting topic to investigate is the detection of behavioural transitions, or perturbations, that define periods of stability and instability in these systems. Particularly in Basketball, research regarding the identification of perturbations is scarce and mainly centred in game-actions to a player level. To a team level, basketball performance could also be influenced by players' substitutions, time-outs, teams fourth foul, players' exclusions or technical fouls. No research is available on how these contextual factors could affect team performance and therefore could be system perturbations. Therefore, this study has the aim of identifying the effects of these contextual factors on team efficacy in several different game conditions (outcome, location, final score differences, period).

## Materials and methods

Play-by-play data was gathered for all 34 regular season games played by one Spanish first level basketball team (2004/2005). Data was introduced in BSK software in order to calculate partial in-game efficacy (points scored per 100 ball possessions) according to all studied contextual factors and game conditions for confronting teams. Perturbations were identified through correlation between confronting teams' efficacy and subsequent cluster analysis. Data reliability was high (above 0.90). Differences in perturbations across game conditions were identified by chi-square test with Bonferroni significance correction (when appropriate).

## Results

A total of 60 perturbations were identified. Most of them occurred in the first and fourth game periods ( $p < 0.05$ ). The first game period perturbations were identified in unbalanced games, whereas the fourth game period perturbations were identified in balanced games ( $p < 0.05$ ). Perturbation-associated game context varied across game conditions. The most significant contextual factor associated to perturbations were time-out for balanced games and players substitutions for unbalanced games ( $p < 0.05$ ). Additionally, the team won more games when there were less substitutions and more time-outs ( $p < 0.05$ ). The team's fourth foul was associated with teams unfavourable perturbations ( $p < 0.05$ ).

## Discussion

The results suggest that basketball performance was influenced differently by the studied contextual factors and conditions. The games were played in two different scenarios: (a) teams confronted themselves in stability conditions until the fourth quarter were most of the perturbations occurred mainly preceded by time-outs; (b) teams has immediate instability in their confrontation and the gained advantage has permitted the system to go stable until the end, players substitutions preceded these perturbations.